File Copy--Please return to
OFFICE OF LEGISLATIVE ANALYSIS, NIH
Building 1, Room 224

RESEARCH PROGRAMS IN AGING

Studies Conducted or Supported by the
National Institutes of Health
During 1960

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Public Health Service

61.1

61.1

RESEARCH PROGRAMS IN AGING

Studies Conducted or Supported by the
National Institutes of Health
During 1960

Prepared by the Center for Aging Research as background material for submission at Congressional hearings on appropriations for fiscal year 1962

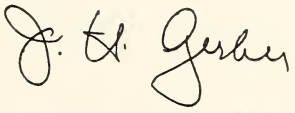
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health
Division of General Medical Sciences
Center for Aging Research
Bethesda 14, Maryland

Public Health Service Publication No. 835

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. - Price 15 cents

Preface

This report summarizes research programs in aging carried out or supported, during calendar year 1960, by the various components of the National Institutes of Health. Companion documents include "Research Highlights in Aging" and "Activities of the National Institutes of Health in the Field of Gerontology." Copies of each may be obtained from the Center for Aging Research.



JOSEPH H. GERBER, M.D.,
Director, Center for Aging Research.

APRIL 1961.

Table of Contents

	Page
INTRODUCTION	1
INTRAMURAL ACTIVITIES	1
EXTRAMURAL ACTIVITIES	5
EXTRAMURAL STATISTICAL SUMMARIES	13
APPENDIXES	17

Summary of National Institutes of Health Programs in Aging, 1960

INTRODUCTION

The purpose of this document is to report on the many programs in aging research being supported by the National Institutes of Health, including both intramural and extramural activities. There has been a notable increase in the number of aging research projects initiated during 1960 as compared with previous years.

The three broad areas in which research is being supported are: the behavioral and social sciences, the clinical sciences, and the biological sciences. These research activities seek to provide the answers to questions relating to the older person's mental health, physical well-being, and the very basic questions relating to the exact nature of the biologic processes and their relationships with disease.

INTRAMURAL ACTIVITIES

It should be recognized that all NIH research projects will produce information accruing to the benefit of all age groups, including the older age group. The chronic disorders, such as heart disease, cancer, arthritis, blindness, mental illness, and metabolic and dental disorders, in which the seven Institutes carry on research, all affect the older age group in varying degrees, as do the infectious diseases which are also the subject of continuing study.

In addition, there are two intramural programs devoted especially to aging: Section on Aging, National Institute of Mental Health, and Gerontology Branch of the National Heart Institute.

Section on Aging, National Institute of Mental Health

This unit, established in 1953, is organized to secure, through experimental investigations of the behavioral capacities and physiologi-

cal status of animals and humans, an understanding of aging as a natural phenomenon. It is attempting to accumulate systematic information concerning behavioral and physiological changes associated with age. In addition, it is systematically investigating age-related impairments of the mental processes in man and is studying possible methods of preventing or repairing such impairments.

This work is being carried out by a staff of psychologists, physiologists, and chemists working under the direction of Dr. James E. Birren.

Most of the deleterious behavioral effects of the aging process that have been demonstrated have been related to motor and reactive capacities. No evidence of degeneration of cortical or subcortical neural materials has as yet been detected. The observed deterioration in problem-solving performance in older subjects appears to be related to a detriment in associative facility and regulation, and much future research will be directed toward discovering ways of compensating for, repairing, or preventing some of the more distressing deficiencies of cognitive functioning associated with age.

The Institute's Laboratory of Clinical Science has been conducting a multidisciplinary investigation, assessing physiological, psychiatric, psychological, and sociological characteristics in a group of elderly symptom-free males. Findings indicate no reductions in cerebral blood flow and oxygen consumption as a result of chronological aging alone, but associate such deterioration with arteriosclerosis of the cerebral vessels. In the psychiatric area, it was found that many of the psychiatric conditions are not age determined, but are similar to mental illness of other age groups, indicating that the aged mentally ill need much the same kinds of treatment as younger persons.

The subjects also cooperated in a sociological investigation. Answers were sought to such questions as: What are the activities, interests, and aspirations that make up day-to-day living? Do earlier patterns of living carry over into old age? How much of behavior is a function of current environmental circumstances? It was determined that there is a relationship between the loss of close relatives and friends and psychiatric assessments of depression and the subject's self-reported decline. Inadequate mental functioning was associated with poor social functioning.

A series of followup studies is planned in which survivors of the group originally studied during 1955–57 will be reevaluated to provide much-needed longitudinal data, bearing directly on the course of changes in various psychological functions during the very late years of life.

During the past year, the Section on Aging completed 11 of the 15 chapters planned for a monograph, to be published in the spring of

1961, which reports the results of the extended, interdisciplinary study of aging.

Members of the staff of the Section on Aging were called upon during the year to participate in a variety of extramural activities in the United States and abroad. Dr. James E. Birren, Chief of the Section, conducted a Research Seminar in the "Psychological Aspects of Aging" and taught a graduate course on the "Cognitive Function in Old Age" at the University of Chicago. Dr. Birren also presented a paper before the Conference on the Physiology and Psychology of Aging in Paris, France. In addition to these activities, Dr. Birren served as organizer and Chairman of the Research Seminar on Psychological Capacities held at Berkeley, Calif. This conference preceded a related conference, the Fifth International Congress of Gerontology, held in San Francisco, at which Dr. Birren acted as Program Chairman for the Section on Experimental Psychology. Drs. Jack Botwinick and Edward A. Jerome also presented reports on their research at the Fifth International Congress of Gerontology.

At the conclusion of this report (App. A) is a complete list of professional articles and other written material which were published by the Section during 1960.

Gerontology Branch, National Heart Institute

This unit, established in 1941, is under the direction of Dr. Nathan W. Shock and is one of the oldest programs in the field of aging in the United States. The research being done ranges from studies of primitive forms of life to long-term studies on human beings of various age levels. Working with Dr. Shock are histologists, physiologists, biochemists, psychologists, biophysicists, embryologists, zoologists, chemists, and physicians.

The program of the Branch is set up under two principal headings: *Basic Biology*, including the Sections on Comparative and Cellular Physiology, Nutritional Biochemistry, Intermediary Metabolism, Morphology, Biophysics, and Molecular Biology; and *Human Physiology and Clinical Medicine*, including the Sections on Cardiovascular-renal Physiology, Metabolism and Endocrinology, Human Performance, Clinical Medicine, Psychological Aspects of Aging, Physiological Psychology, Mental Performance, and Personality.

Studies reported on during 1960 include longitudinal studies made on approximately 250 men age 18 to 100 years, from the upper socioeconomic and education levels living in the community. A few preliminary comparisons of measurements made on this selected sample with those made on an indigent population show that some physiological functions show differences, while others do not. For example,

the sample group is, on the average, taller and heavier and shows better retention of pulmonary function with increasing age than the indigent group. However, there were no systematic differences in basal metabolism or renal function.

A new equation for estimating body fat in the intact human from determinations of specific gravity or total water content, which introduces corrections for bone density (based on X-ray measurements) and muscle mass (based on creatinine excretion), was developed. Using this equation, a loss of body fat at advanced ages was found.

In another study on 200 subjects, no significant change with age was found in the protein-bound iodine content of the blood.

Age changes in ability to perform simple motions efficiently have been studied, using maximum back-and-forth swings of the arm. Measurements of excess oxygen required for the task have been made which permit the calculation of the efficiency of the motion at different amplitudes and rates of swing. It is apparent that age differences exist in the effectiveness of the mechanism controlling the movement.

Other studies have indicated that age differences in speed of reaction are primarily associated with alterations in the central nervous system.

Short-term memory was more easily impaired in old subjects than young. This was true for both visual judgments of areas and estimates of time intervals. In the case of visual judgments, the age-dependent interference was greater in subjects with low educational attainment than in those with high, but for the estimates of time intervals, both groups showed similar degrees of interference.

A mathematical analysis of mortality data has permitted a rational derivation of the Gompertz equation, with the identification of coefficients of the equation that can serve as an index of "vitality" in a population.

With increasing age, granules of insoluble material accumulate inside the cells of cardiac tissue in humans. The granules are highly fluorescent and can be observed microscopically in sections of cardiac tissue. The granules have been isolated from human hearts obtained at autopsy for chemical analysis. Preliminary results indicate that the particles are composed of lipid and protein.

The effects of environmental factors such as temperature, oxygen tension, and radiation of life span have been tested in fruit flies. At increased environmental temperatures longevity is substantially reduced. Exposure to 100 percent oxygen shortens and low oxygen (1–2 percent) lengthens life span in these flies.

These results lend support to the theory that the "rate of living" influences life span. High levels of radiation shorten life span of flies reared in sterile environments.

Age changes in tissue metabolism are being studied in liver, kidney, brain, and muscle of young and senescent rats. Earlier experiments

from this laboratory have shown that the activity of a proteolytic enzyme, cathepsin, increases with age.

In other experiments, using radioactive markers, it has been shown that mitochondria probably break down and are resynthesized as units. The half-life of liver mitochondria was estimated as 10.3 days in both young and old rats.

Aging has also been studied in protozoan cultures (bleached *Euglena*) in which cell division has been halted by removing sources of either carbon or nitrogen from the culture medium. Cultures have been maintained at constant cell counts for 3–6 months. The cells remain viable, but the RNA content diminishes markedly with time. When the cells are "aged" in a medium that contains no sulfur, they cannot survive for more than about 1 month. Thus the mechanisms which permit the cell to survive in the face of nitrogen or carbon depletion do not function in the case of sulfur depletion.

To carry out this extensive research program, the Gerontology Branch utilizes the facilities of the Baltimore City Hospitals which provide for laboratory space; a 50-bed research ward with all facilities for patient care; and access for study to all patients in the 1,500-bed hospital and 1,000-bed Old People's Home.

Preliminary plans for a new basic science research building, essential to relieve congested laboratory conditions at the Baltimore City Hospitals, have been drawn up, with the assistance of members of the staff of the Gerontology Branch.

At the conclusion of this report (App. B) is a complete list of articles and other written materials which were published by the Branch during the past year.

EXTRAMURAL ACTIVITIES

Center for Aging Research

The Center, established in the fall of 1956, is a branch of the Division of General Medical Sciences. The purpose of the Center is to stimulate and assist the development of new research projects in gerontology at universities, medical centers, and various other research institutions in this country and abroad; to maintain liaison between the NIH intramural and extramural programs, with other bureaus and divisions of the Department of Health, Education, and Welfare, and with other Federal agencies and organizations supporting programs in aging; to foster the training of additional research personnel; to collect and disseminate data related to research in

aging; and to sponsor conferences, symposia, and seminars on research and training problems in the field of aging.

A major activity of the Center is the identification of "gap" areas in aging research needing new or additional emphasis. A major basis in determining these "gap" areas is the information obtained through the yearly compilation of the document, "Activities of the NIH in the Field of Gerontology." This publication lists all grants made by NIH for extramural as well as intramural research. The Center classifies as relating to aging those projects ranging from fundamental studies in the biology of the aging process to studies concerned with the physical, psychological, and social problems of aging people.

The activities of the Center during 1960 included giving full cooperation to the White House Conference on Aging, working with the Federal Council on Aging, working with the Federal Aviation Agency in its research grants program on the relationship between aging and pilot performance, and participating in national and international meetings on aging.

Fourteen major conferences on the problems of aging were attended by the staff members during 1960. One of the more notable was the Fifth International Congress of Gerontology.

In line with fostering the exchange of information on aging among the countries of the world, the Center for Aging Research is sponsoring the publication of a translation, from the Russian, of the review by Prof. V. N. Nikitin, corresponding member of UKrSSR, Academy of Sciences, "Russian Studies on Age-associated Physiology, Biochemistry, and Morphology." This review covers Russian research in aging between 1761 and 1958. The Clinical Center Library translated the text, and the Russian Scientific Translation Program translated the bibliography.

Other informational activities of the Center included the preparation and distribution of "Research Highlights in Aging," "Summary of NIH Research Programs in Aging," and the "Activities of the NIH in the Field of Gerontology." All booklets are available upon request to the Center for Aging Research.

A list of the speeches given and papers published by members of the CAR staff and other members of the Division of General Medical Sciences appears in Appendix D at the conclusion of this report.

Expenditures for extramural research in aging sponsored by NIH have risen from $4,570,000 in 1958 to $16,234,564 in fiscal year 1960. It is anticipated that they will reach $20 million in 1961. Another million dollars is spent annually in the conduct of the intramural research program in aging.

Extramural projects have risen in number from 274 in 1958 to 700 in 1960, with a rise to over 800 anticipated for 1961. The projects listed by the Center for Aging Research represent that portion of the total number of submitted projects which specifically bears upon major problems of aging.

At the conclusion of this section are four tables covering the growth of the grant program in aging, reflecting the activity of each Institute and the Division of General Medical Sciences, since 1958.

Interdisciplinary Research Centers

In addition to the two previously established multidisciplinary programs at Duke University (1957) and Albert Einstein College of Medicine (1958), two new programs were approved and put into operation during calendar year 1960. These were Western Reserve University, Cleveland, Ohio, inaugurated May 1960; and the University of Miami School of Medicine, Coral Gables, Fla., inaugurated September 1960.

The program at *Western Reserve University* involves the entire university and several affiliated hospitals. Principal attention is being given to the chronic diseases, with emphasis on the rehabilitation aspects. Investigations into the basic biological changes in aging are also being carried out.

At the *University of Miami School of Medicine* the program will be entirely basic in its approach to aging. It involves the medical school, the main university, and the marine biology laboratory in related studies in anatomy, physiology, biochemistry, microbiology, and botany.

The program established at *Duke University* in 1957 has been most fruitful. Each year the number of research reports being presented by the Duke scientists is increasing. Some of the papers presented during 1960 are listed in Appendix C.

The Duke program emphasizes the psychiatric, psychologic, and social sciences, but also includes biochemical studies and studies on atherosclerosis.

The program at *Albert Einstein College of Medicine* is focusing on metabolic changes which result with aging, including research in the biochemical, physiological, and pathological alterations. Heart disease is receiving much attention, in addition to those genetic conditions which seem to predispose certain persons to illness.

Papers published by the scientists working at the Albert Einstein College of Medicine are listed in Appendix C.

Division of General Medical Sciences

In its responsibility for supporting research and research training in the sciences basic to medicine and biology, and in public and environmental health and medical care, the Division of General Medical Sciences is carrying out a program primarily aimed at developing more information on the basic biological nature of the aging process in the cells and tissues of the body, in organs such as the liver, and as related to enzymes and hormones. The work includes investigations into the importance of genetics in the character of the aging process and in longevity. Studies on the influences of nutrition and on the effects of man's living and working environment also are being supported, along with investigation into better rehabilitation techniques for older persons. At present the Division is supporting a total of 102 projects related to aging.

The Fifth International Congress of Gerontology held August 7–12, 1960, in San Francisco, was sponsored jointly by the Division of General Medical Sciences and the National Heart Institute. More than 1,100 persons representing 35 nations attended this meeting.

National Heart Institute

Effects of aging on human performance are intimately associated with effects of aging on the cardiovascular system, since the activity of every organ in the body depends on an adequate supply of blood. The National Heart Institute, realizing that aging brings about major changes in the heart muscle and in blood vessels, pioneered in the conduct and support of gerontological research and continues to develop and sponsor programs of four types: integrated multidisciplinary projects; research in problems of aging; research in the care of the aged; and programs to train personnel and disseminate gerontologic information.

Gerontologic research conducted by the Institute constitutes one of the most comprehensive and longest established programs of scientific investigation into aging. This growing research activity provides a background of gerontologic knowledge and productive research studies that make it a national and international resource in the field.

Supporting aging research, 70 research and training projects classified as primarily concerned with aging are being currently supported by the National Heart Institute. Projects range from basic research on aging in short-lived lower organisms to integrated, co-

operative studies of elderly persons. Scientists are investigating the influence on the aging process of diet, heredity, changes in hormone production, and changes in connective tissue, as well as the mechanisms of cardiac failure in persons over 65 years and the rehabilitation of elderly cardiovascular patients.

As previously reported in the section on the activities of the Division of General Medical Sciences, the National Heart Institute shared in sponsoring the Fifth International Congress of Gerontology.

The National Heart Institute, working with the Atomic Energy Commission and the American Institute of Biological Sciences, continues to support research conferences on the relationship between radiation and aging.

Three books have been published by an Inter-University Committee, which was supported in part by the National Heart Institute. The first book, "Handbook of Aging and the Individual," was edited by Dr. James E. Birren; the second, "Handbook of Social Gerontology," was edited by Mr. Clark Tibbitts; and the third, "Aging in Western Societies," was edited by Dr. Ernest W. Burgess.

National Cancer Institute

Although the true relationship between cancer and the aging process is not known, there is reason to believe that the two may be closely connected. Scientists whose work is supported by grants from the National Cancer Institute are contributing information that could significantly increase knowledge of both malignant disease and the phenomena of aging.

For example, it is generally accepted that our environment contains agents that probably contribute to the development of malignant disease. The fact that older persons have been exposed to such agents for relatively long periods may account for the greater occurence of cancer in later life. Yet, it is also recognized that not all persons similarly exposed to environmental carcinogens develop malignant disease. Research in the area of environmental cancer will probably shed light on many important aspects of the aging process, including bodily changes that influence liability to malignant disease.

In other studies, scientists have observed that some mammalian cells growing in the test tube ultimately acquire malignant properties. Investigations in this area, which are concerned with the innermost workings of living matter, could provide vital basic knowledge of metabolic processes that are at the heart of the mechanism of aging, the cancer problem, and perhaps all biological phenomena.

National Institute of Allergy and Infectious Diseases

This Institute is supporting a number of studies which are attempting to determine the interplay between age of the host and his susceptibility to infection. At the present time seven extramural studies are concerned primarily with problems in the field of aging.

National Institute of Arthritis and Metabolic Diseases

A considerable variety of studies on structural aspects and on physiological and biochemical aspects of aging are supported through research project grants by this Institute. Biophysical techniques, including electron microscopy and X-ray, are being used to delineate the fine molecular and tissue structure of senescent tissues, particularly in bones, joints, and endocrine glands. Investigations are also being made of alterations in thyroid and adrenal steroid function and of body composition in aging, of mineral metabolism in bone diseases afflicting the elderly, and of amino acid, vitamin, and other nutritional requirements in relation to aging. Many fundamental studies performed by Institute grantees will provide information on growth, maturation, and degeneration in both single cells and whole organ systems. These include study of factors affecting the life span of red blood cells and of formation and deterioration of collagen, the chief constituent of articular cartilage and connective tissue.

Other Institute-supported studies are concerned with many aspects of diseases associated with aging, notably osteoarthritis and osteoporosis. Institute scientists at Bethesda are also investigating osteoporosis, osteoarthritis, processes of collagen formation, and aspects of nutrition related to aging.

The Institute participates in the support of a comprehensive program of research in aging at the Yeshiva University's Albert Einstein College of Medicine.

National Institute of Dental Research

With an increasing population of middle-aged and older citizens, periodontal disease has moved to the forefront as a leading cause of tooth loss in this country. This is reflected in epidemiological studies by the Institute to determine the prevalence and severity of oral diseases.

Laboratory experiments have shown that tartar formation, a factor in periodontal disease, is not dependent on the presence of bacteria.

Thus, broad biochemical studies now being supported may provide the research leads necessary for an understanding of tartar formation and accompanying tissue changes.

Other basic studies seek to determine the extent to which bacterial endotoxins contribute to the degradation of oral soft tissues. Of particular interest are studies of bacterial enzymes that apparently play a role in the destruction of connective tissue necessary for the support and retention of teeth.

National Institute of Mental Health

Among those social problem areas which are of special concern to the National Institute of Mental Health, the subject of aging involves the greatest number of people. With the increasing complexity of society, the process of aging has become fraught with many mental health problems. The National Institute of Mental Health initiates, coordinates, and supports an extensive research grants program in the field of aging in an attempt to provide fuller understanding of the processes involved, to help alleviate the psychological problems of older people, and to restore to society some of the human potential now lost. The research projects on aging which the Institute supports bridge many disciplines and a wide variety of research approaches. Some of the biologically oriented studies are concentrated on the effect of aging on the central nervous system, senile degeneration of the brain, and cerebral physiology in functional disorders. Other studies of the aging process relate to psychological criteria of aging, attitudes of older people toward death, general social attitudes toward old people, and environmental and personality factors influencing adjustment of older people, including a scientific investigation of adverse consequences of social isolation. Two large multidisciplinary research projects are concerned with the general aspects of the total aging process—physiological, psychological, and social. Another major study is concentrated on aspects of "normal" aging of older people living in an average community. During 1960 the Institute also supported a special research seminar on the social and psychological aspects of aging in order to promote wider exchange and utilization of new concepts in this field. However, despite research advances, and no matter what the hopes are for prevention of some of the adverse concomitants of old age, geriatric mental problems will continue to be a part of 20th-century society. The Institute, therefore, is also supporting studies aimed at improving methods for care and treatment of psychiatric geriatric patients.

National Institute of Neurological Diseases and Blindness

Seventy-one extramural and several intramural projects are supported by this Institute which relate directly to aging. Of prime interest are studies on changes in nerve cells and tissue function with age, particularly reflex action, cataracts, glaucoma, deafness, and strokes.

These studies have a special bearing on problems of aging and the state of being aged, since the nerve tissues and sensory structure of higher organisms play a controlling role in determining activity.

EXTRAMURAL STATISTICAL SUMMARIES

The following tables show the number and annual value of research and training grants in aging that were active on January 31, 1961, January 31, 1960, January 31, 1959, and January 31, 1958. The fiscal year columns indicate the appropriation from which funds were derived to support these projects, although these tables essentially reflect calendar year activity. The date of January 31 was chosen in order to include the actions of the November meetings of the National Advisory Councils.

NIH Research and Training Grants in Aging Active as of January 31, 1961

Primarily Related to Aging

Institute	Number	Fiscal year 1959	Fiscal year 1960	Fiscal year 1961	Total
General*	36	$83,288	$411,525	$912,662	$1,407,475
NCI	14	----------	77,951	155,318	233,269
NHI	70	12,282	277,087	1,363,169	1,652,538
NIAID	7	----------	12,217	45,446	57,663
NIAMD	47	14,220	169,665	605,382	789,267
NIDR	12	----------	44,861	145,250	190,111
NIMH	31	83,038	420,483	479,662	983,183
NINDB	28	----------	111,699	315,451	427,150
Total	245	192,828	1,525,488	4,022,340	5,740,656

Secondarily Related to Aging

Institute	Number	Fiscal year 1959	Fiscal year 1960	Fiscal year 1961	Total
General*	66	$17,879	$713,503	$1,363,558	$2,094,940
NCI	47	----------	384,588	510,335	894,923
NHI	149	94,410	1,166,600	2,457,291	3,718,301
NIAID	32	9,878	68,459	294,085	372,422
NIAMD	70	----------	192,140	1,173,791	1,365,931
NIDR	24	----------	133,637	256,626	390,263
NIMH	24	----------	309,278	388,808	698,086
NINDB	43	----------	156,319	802,723	959,042
Total	455	122,167	3,124,524	7,247,217	10,493,908

*Division of General Medical Sciences.

NIH Research and Training Grants in Aging Active as of January 31, 1960

Primarily Related to Aging

Institute	Number	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Total
General*	28	----------	$393, 851	$715, 276	$1, 109, 127
NCI	19	----------	82, 449	279, 697	362, 146
NHI	72	----------	316, 365	1, 400, 322	1, 716, 687
NIAID	4	----------	11, 215	18, 363	29, 578
NIAMD	42	----------	66, 659	567, 432	634, 091
NIDR	19	$14, 384	119, 919	88, 502	222, 805
NIMH	31	72, 678	485, 141	461, 129	1, 018, 948
NINDB	29	----------	131, 018	336, 498	467, 516
Total	244	87, 062	1, 606, 617	3, 867, 219	5, 568, 898

Secondarily Related to Aging

Institute	Number	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Total
General*	40	----------	$171, 519	$523, 515	$695, 034
NCI	38	----------	211, 577	469, 738	681, 315
NHI	117	----------	907, 711	1, 792, 053	2, 699, 764
NIAID	21	$18, 384	42, 811	192, 825	254, 020
NIAMD	49	11, 129	104, 670	888, 129	1, 003, 928
NIDR	24	8, 012	156, 697	316, 609	481, 318
NIMH	20	----------	190, 189	228, 416	418, 605
NINDB	29	----------	138, 977	509, 509	648, 486
Total	338	37, 525	1, 924, 151	4, 920, 794	6, 882, 470

*Division of General Medical Sciences.

NIH Research and Training Grants in Aging Active as of January 31, 1959

Primarily Related to Aging

Institute	Number	Fiscal year 1958	Fiscal year 1959	Total
General*	15	$18, 192	$532, 231	$550, 423
NCI	20	120, 021	424, 407	544, 428
NHI	60	227, 888	1, 034, 709	1, 262, 597
NIAID	3	20, 350	10, 010	30, 360
NIAMD	35	37, 148	453, 958	491, 106
NIDR	11	38, 785	60, 774	99, 559
NIMH	32	340, 344	514, 716	855, 060
NINDB	21	109, 706	190, 741	300, 447
Total	197	912, 434	3, 221, 546	4, 133, 980

Secondarily Related to Aging

Institute	Number	Fiscal year 1958	Fiscal year 1959	Total
General*	14	$32, 000	$268, 910	$300, 910
NCI	31	180, 556	263, 353	443, 909
NHI	84	441, 079	1, 192, 186	1, 633, 265
NIAID	10	24, 833	81, 558	106, 391
NIAMD	32	50, 344	528, 042	578, 386
NIDR	19	148, 867	152, 760	301, 627
NIMH	6	43, 499	53, 397	96, 896
NINDB	11	17, 239	144, 508	161, 747
Total	207	938, 417	2, 684, 714	3, 623, 131

*Division of General Medical Sciences.

NIH Research and Training Grants in Aging Active as of January 31, 1958

Primarily Related to Aging

Institute	Number	Fiscal year 1955	Fiscal year 1957	Fiscal year 1958	Total
General*	9		$12, 258	$249, 419	$261, 677
NCI	11		40, 853	99, 991	140, 844
NHI	48		138, 700	747, 329	886, 029
NIAID	None				
NIAMD	14		41, 179	132, 434	173, 613
NIDR	7		29, 821	30, 122	59, 943
NIMH	28	$23, 686	162, 972	440, 641	627, 299
NINDB	14		37, 751	79, 215	116, 966
Total	131	23, 686	463, 534	1, 779, 151	2, 266, 371

Secondarily Related to Aging

Institute	Number	Fiscal year 1955	Fiscal year 1957	Fiscal year 1958	Total
General*	5		$122, 262	$81, 951	$204, 213
NCI	20		90, 207	141, 437	231, 644
NHI	60		349, 597	703, 682	1, 053, 279
NIAID	7		2, 501	60, 574	63, 075
NIAMD	21		82, 181	192, 470	274, 651
NIDR	16		121, 426	143, 872	265, 298
NIMH	6		38, 298	35, 706	74, 004
NINDB	8		34, 085	83, 804	117, 889
Total	143		840, 557	1, 443, 496	2, 284, 053

*Division of Research Grants.

APPENDIX A

Section on Aging, National Institute of Mental Health

Publications and Papers Presented

1. Botwinick, Jack, Robbin, Joseph S., and Brinley, Joseph F.: Age Differences in Card-sorting Performance in Relation to Task Difficulty, Task Set, and Practice. *Journal of Experimental Psychology*, Vol. 59, No. 1, January 1960.
2. Botwinick, Jack, and Kornetsky, Conan: Age Differences in the Acquisition and Extinction of the GSR. *Journal of Gerontology*, Vol. 15, No. 1, January 1960.
3. Birren, James E.: Psychological Capacities and the Process of Aging in the Nervous System, A Counterpart Theory of Aging: (1) Presentation at the Conference on the Physiology and Psychology of Aging at the Centre National de la Recherche Scientifique, Paris, France, April 1960. (2) Section on Aging, Laboratory of Psychology.
4. Dallenbach, Karl M., Bitterman, M. E., Newman, E. B., and Postman, Leo: Basis for Lightness-Judgments of Grays. *The American Journal of Psychology*, Vol. LXXIII, pp. 380–387, September 1960.
5. Birren, James E.: Psychological Aspects of Aging. *Annual Review of Psychology*, Vol. 11, 1960.
6. Birren, James E.: Behavioral Theories of Aging. *American Association for the Advancement of Science*, 1960.
7. Streicher, Eugene: The Thiocyanate Space of Rat Brain in Experimental Cerebral Edema.
8. Birren, James E., Butler, Robert N., Greenhouse, Samuel, Sokoloff, Louis, and Yarrow, Marian R.: Introduction to the Study of Human Aging, Birren, J. E. (ed.). *Handbook of Aging and the Individual: Psychological and Biological Aspects.*
9. Streicher, Eugene: The Thiocyanate Space of Rat Brain.
10. Bondareff, William: Distribution of Nissl Substance in Neurons of Rat Spinal Ganglia as a Function of Age and Fatigue.
11. Jerome, Edward A.: Decay of Heuristic Process in the Aged.
12. Jerome, Edward A.: Thinking Ability in the Aged.
13. Birren, James E.: Part I: Intellectual Capacities, Aging and the Nature of Man's Environment—A Discussion of Issues and a Report of Experimental Findings: Part II: Birren, James E., and Morrison, Donald F. Factors in the Organization of Mental Abilities with Advancing Age: Analysis of Intercorrelations of the Wais Subtests in Relation to Age and Education: Part III: Birren, James E., and Riegel, Klaus F., Age Differences in Response Speed as a Function of Controlled Variations of Stimulus Conditions: Lights, Numbers, Letters, Colors, Syllables, Words, and Work Relationships.
14. Birren, James E., Botwinick, Jack, Weiss, Alfred D., and Morrison, Donald F.: Cognitive Processes: III—An Analysis of Mental and Perceptual Tests Given to Healthy Elderly Men.

APPENDIX B

Gerontology Branch, National Heart Institute

Publications and Papers Presented

1. Shock, Nathan W.: Index to Current Periodical Literature. *Journal of Gerontology*, Vol. 15, No. 1, January 1960.
2. Blum, Jacob J.: Interaction Between Myosin and its Substrates. *Archives of Biochemistry and Biophysics*, Vol. 87, No. 1, March 1960.
3. Searls, R. L. (introduction by Zill, L. P.): Evidence for Dithiol Participation in Dihydrothioctyl Dehydrogenase Reaction. *Federation Proceedings*, Vol. 19, No. 1, Pt. I, March 1960.
4. Fluharty, A. L., and Sanadi, D. R.: Evidence for Dithiol Function in Oxidative Phosphorylation Based on Uncoupling by Aresenite. *Federation Proceedings*, Vol. 19, No. 1, Pt. I, March 1960.
5. Baker, Saul P., Shock, Nathan W., and Norris, Arthur H.: Effects of Age and Obesity on Basal Oxygen Consumption of Women as Related to Body Fluid Compartments. *Federation Proceedings*, Vol. 19, No. 1, Pt. I, March 1960.
6. Mildvan, A. S., and Strehler, B. L.: Fluorescent Lipids from Heart Age Pigment. *Federation Proceedings*, Vol. 19, No. 1, Pt. I, March 1960.
7. Ramsey, Robert W., Norris, A. H., LeVora, N. W., Shock, N. W., Street, Sybil, Bower, John, Miller, M. R., Rudolph, Rosser, and Szumski, Alfred: An Analysis of Alternating Movements of the Human Arm. *Federation Proceedings*, Vol. 19, No. 1, Pt. I, March 1960.
8. Searls, Robert L., and Sanadi, D. R.: Evidence for a Vicinal Dithiol in Dihydrothioctyl Dehydrogenase. *Biochemical and Biophysical Research Communications*, Vol. 2, No. 3, March 1960.
9. Searls, Robert L., and Sanadi, D. R.: Oxidation of α-Ketoglutarate by Artificial Electron Acceptors. *Biochemical and Biophysical Research Communications*, Vol. 2, No. 3, March 1960.
10. Norris, A. H., and Shock, N. W.: The Six S's. *Newsletter of the Gerontological Society*, Vol. 7, No. 1, March 1960.
11. Shock, Nathan W.: Index to Current Periodical Literature. *Journal of Gerontology*, Vol. 15, No. 2, April 1960.
12. Barrows, Charles H., Jr., Falzone, Joseph A., Jr., and Shock, Nathan W.: Age Differences in the Succinoxidase Activity of Homogenates and Mitochondria From the Livers and Kidneys of Rats. *Journal of Gerontology*, Vol. 15, No. 2, April 1960.
13. Fluharty, Arvan, and Sanadi, D. R.: Evidence for a Vicinal Dithiol in Oxidative Phosphorylation. *Proceedings of the National Academy of Sciences*, Vol. 46, No. 5, pp. 608–616, May 1960.
14. Blum, Jacob J.: Concentration Profiles in and Around Capillaries. *The American Journal of Physiology*, Vol. 198, No. 5, May 1960.
15. Baker, Saul P., Landowne, Milton, and Gaffney, George W.: Electrocardiographic Changes Following the Administration of Thyroid Stimulating Hormone. *The American Journal of Cardiology*, Vol. 5, p. 707, May 1960 (Abstract).
16. Searls, Robert L., and Sanadi, D. R.: On the Mechanism of Dihydrothioctyl Dehydrogenase Reaction. *The Journal of Biological Chemistry*, Vol. 235, No. 8, June 1960.
17. Strehler, Bernard L., and Mildvan, Albert S.: General Theory of Mortality and Aging. *Science*, Vol. 132, No. 3418, pp. 14–21, July 1960.

18. Gaffney, George W., Gregerman, Robert I., Yiengst, Marvin J., and Shock, Nathan W.: Serum Protein-Bound Iodine Concentration in Blood of Euthyroid Men 18 to 94 Years. *Journal of Gerontology*, Vol. 15, No. 3, July 1960.
19. Shock, Nathan W.: Index to Current Periodical Literature. *Journal of Gerontology*, Vol. 15, No. 3, July 1960.
20. McCarthy, Joseph D., Shock, Nathan W., Swartz, Frederick C., and Weinberg, Jack: Panel Discussion on Concepts of the Medical Profession in Relation to Aging. *Journal of the American Geriatrics Society*, Vol. VIII, No. 8, August 1960.
21. Searls, Robert L., and Sanadi, D. R.: α-Ketoglutaric Dehydrogenase, VIII. Isolation and Some Properties of a Flavoprotein Component. *The Journal of Biological Chemistry*, Vol. 235, No. 8, August 1960.
22. Konigsberg, Irving R.: On the Relationship Between Development and Aging. *Newsletter of the Gerontological Society*, Vol, 7, No. 3, September 1960.
23. Shock, Nathan W.: Index to Current Periodical Literature. *Journal of Gerontology*, Vol. 15, No. 4, October 1960.
24. Hugin, Felix, Norris, Arthur H., and Shock, Nathan W.: Skin Reflex and Voluntary Reaction Times in Young and Old Males. *Journal of Gerontology*, Vol. 15, No. 4, October 1960.
25. Barrows, Charles H., Jr.: Age and Cellular Metabolism of Tissues. *The Biology of Aging*, American Institute of Biological Sciences Symposium, No. 6, 1960.
26. Mildvan, Albert S., and Strehler, Bernard L.: A Critique of Theories of Mortality. *The Biology of Aging*, American Institute of Biological Sciences Symposium, No. 5, 1960.
27. Suci, George J.: A Comparison of Semantic Structures in American Southwest Culture Groups. *Journal of Abnormal and Social Psychology*, Vol. 6z, No. 1, 25–30, 1960.
28. Strehler, B. L.: Fluctuating Energy Demands as Determinants of the Death Process (A Parsimonious Theory of the Gompertz Function). *The Biology of Aging*, American Institute of Biological Sciences Symposium, No. 6, 1960.
29. Shock, N. W.: Age Changes in Physiological Functions in the Total Animal: The Role of Tissue Loss. *The Biology of Aging*, American Institute of Biological Sciences Symposium, No. 6, 1960.
30. Author Index to Current Periodical Literature. *Journal of Gerontology*, Vol. 15, No. 4, October 1960.

APPENDIX C

Duke University School of Medicine and Albert Einstein College of Medicine

DUKE UNIVERSITY

Publications and Papers Presented

1. Busse, Ewald W., Dovenmuehle, Robert H., and Brown, Robert G.: Psychoneurotic Reactions of the Aged. *Geriatrics*, Vol. 15, pp. 97–105, February 1960.
2. Busse, Ewald W.: Clinical Principles Underlying Administrative Practices. *Mental Hospitals*, Eleventh Mental Hospital Institute Proceedings, The Geriatric Patient-Psychiatric and Social Problems, Vol. 11, No. 2, February 1960.
3. Busse, E. W., and Dovenmuehle, R. H.: Neurotic Symptoms and Predisposition in Aging People. *Journal of the American Geriatrics Society*, Vol. VIII, No. 5, May 1960.
4. Davidson, Eugene A., and Riley, Joseph G.: Chrondroitin Sulphate B Metabolism. *Biochimica et Biophysica Acta*, June 1960.
5. Busse, Ewald W.: The Health and Adjustment of the Aged Person. Address delivered at the Governor's Conference on Aging, July 28, 1960, Raleigh, N.C.
6. Gunnells, J. C., Gorten, R., Bogdonoff, M. D., and Warren, J. V.: The Effect of Alterations in Arousal of the Central Nervous System upon Cardiovascular Response to Intravenous Epinephrine. *American Heart Journal*, Vol. 60, No. 2, pp. 231–236, August 1960.
7. Jeffers, Frances, Nichols, Claude R., and Eisdorfer, Carl: Attitudes of Old Persons Toward Death: A Preliminary Study. A version of this paper was delivered at the Fifth Congress of the International Association of Gerontology, San Francisco, Calif., August 1960.
8. Busse, Ewald W.: Findings from the Duke Geriatrics Research Project on the Effects of Aging upon the Nervous System. Presented at the Fifth International Congress of Gerontology, San Francisco, Calif., August 1960: Submitted for publication in the *Proceedings* of this Congress.
9. Busse, Ewald, W.: The Health and Adjustment of the Aged Person. *Public Welfare News*, 24: 3, September 1960.
10. Wakil, Salih J.: The Mechanism of Fatty Acid Synthesis. *American Journal of Clinical Nutrition*, Vol. 8, September–October 1960.
11. Busse, Ewald W.: Problems Affecting Psychiatric Care of the Aging. *Geriatrics*, Vol. 15, pp. 673–680, October 1960.
12. Dovenmuhle, R. H., Newman, E. G. and Busse, E. W.: Physical Problems of Psychiatrically Hospitalized Elderly Persons. *Journal of the American Geriatrics Society*, Vol. VIII, No. 11, November 1960.
13. Newman, Gustave, Dovenmuehle, R. H., and Busse, E. W.: Alterations in Neurologic Status With Age. *Journal of the American Geriatrics Society*, Vol. VIII, No. 12, December 1960.
14. Klein, Robert F., and Bogdonoff, Morton D.: Effects of Phentolamine (Regitime) on Human Plasma FFA *in vivo* (25590). *Proceedings of the Society for Experimental Biology and Medicine*, 1960.
15. Busse, Ewald W.: Mental Disorders of the Aging. *The Older Patient*, by 21 authors, edited by Wingate M. Johnson, M.D., Publishers: Paul B. Hoeber, Inc., Medical Division of Harper & Bros., 1960.

In Press

1. Jeffers, Frances C.: The Nature and Significance of Social Work Participation in Interdisciplinary Research on Aging. Accepted for publication in *Geriatrics.*

ALBERT EINSTEIN COLLEGE OF MEDICINE

Publications and Papers Presented

1. Lippman, Heinz I., and Goldin, Ralph R.: Subcutaneous Ossification of the Legs in Chronic Venous Insufficiency. *Radiology*, Vol. 74, No. 2, pp. 279–288, February 1960.
2. Williams, M. Henry, Jr., and Zohman, Lenore R.: Cardiopulmonary Function in Bronchial Asthma. *The American Review of Respiratory Diseases*, Vol. 81, No. 2, February 1960.
3. London, Irving M.: Metabolism of the Mammalian Erythrocyte. *Bulletin of the New York Academy of Medicine*, 2d Series, Vol. 36, No. 2, pp. 79–96, February 1960.
4. Cook, Jean L., Lowy, Bertram A., and London, Irving M.: Purine Necleotide Biosynthesis in the Rabbit Reticulocyte. *Federation Proceedings*, Vol. 19, No. 1, Pt. I, March 1960.
5. Williams, M. Henry, Jr.: Hypoxemia Due to Venous Admixture in Cirrohis of the Liver. *Journal of Applied Physiology*, Vol. 15, No. 2, March 1960.
6. Morrell, Anatol G., and Scheinberg, I. Herbert: Heterogeneity of Human Ceruloplasmin. *Science*, Vol. 131, No. 3404, pp. 930–932, March 1960.
7. Weinstein, Clement, Seifter, S., and Berkman, J. E.: Peptide-Nucleotide Associations in Rat Liver. *Federation Proceedings*, Vol. 19, No. 1, Pt. I, March 1960.
8. Aisen, Philip, Schorr, Julian B., Morell, Anatol G., Gold, Ruth Z., and Scheinberg, I. Herbert: A Rapid Screening Test for Deficiency of Plasma Ceruloplasmin and Its Value in the Diagnosis of Wilson's Disease. *The American Journal of Medicine*, Vol. XXVIII, No. 4, pp. 550–554, April 1960.
9. Scheinberg, I. Herbert, and Sternlieb, Irmin: The Pathogenesis and Clinical Significance of the Liver Disease in Hepatolenticular Degeneration (Wilson's Disease). *The Medical Clinics of North America*, Vol. 44, No. 3, May 1960.
10. Arias, Irwin M.: Recent Advances in the Metabolism of Bilirubin and Their Clinical Implications. *The Medical Clinics of North America*, Vol. 44, No. 3, May 1960.
11. Abramson, Arthur S., and Delagi, Edward F.: The Contributions of Physical Activity to Rehabilitation. *The Research Quarterly*, 31: 2, pp. 365–375, May 1960.
12. Deming, Q. B., Daly, M. M., Bloom, J., Brun, L., and Kaplan, R.: Effect of Antihypertensive Treatment in the Rat on the Potentiation of Atherogenesis by Experimental Hypertension. *Journal of Clinical Investigation*, Vol. 39, No. 6, p. 980, June 1960.
13. Lippmann, Heinz: Heteroptic Ossification, A Problem in Rehabilitation Medicine. *Archives of Physical Medicine and Rehabilitation*, Vol. 41, August 1960.
14. Scheinberg, I. Herbert, and Sternlieb, Irmin: The Long Term Management of Hepatolenticular Degeneration (Wilson's Disease). *The American Journal of Medicine*, Vol. XXIX, No. 2, pp. 316–333, August 1960.
15. Scheinberg, I. Herbert, and Sternlieb, Irmin: Copper Metabolism. *Pharmacological Reviews*, Vol. 12, No. 3, September 1960.
16. Gallop, Paul M., Seifter, Sam, Lukin, Marvin, and Meilman, Edward: Application of the Lossen Rearrangement of Dinitrophenylhydroxamates to Analysis of Carboxyl Groups in Model Compounds and Gelatin. *The Journal of Biological Chemistry*, Vol. 235, No. 9, September 1960.
17. Seifter, Sam, Gallop, Paul M., Michaels, Susan, and Meilman, Edward: Analysis of Hydroxamic Acids and Hydrazides; Preparation and Properties of Dinitrophenyl Derivatives of Hydroxamic Acids, Oximes, Hydrazides, and Hydrazones. *The Journal of Biological Chemistry*, Vol. 235, No. 9, September 1960.

18. Makover, H. B.: Demography in the Medical Curriculum. *Journal of Medical Education*, 35: 809–811, September 1960.
19. Fischel, Edward E., and Frank, Charles W.: The Evolution of H Rheumatic Heart Disease in Children, Five-Year Report of a Cooperative Clinical Trial of ACTH, Cortisone, and Aspirin. *Circulation*, Vol. XXII, No. 4, October 1960.
20. Lowy, Bertram A., Ramot, Bracha, and London, Irving M.: The Biosynthesis of Adenosine Triphosphate and Guanosine Triphosphate in the Rabbit, Erythrocyte *in Vivo* and *in Vitro*. *The Journal of Biological Chemistry*, Vol. 235, No. 10, October 1960.
21. Lowy, Bertram A., and Williams, Marjorie K.: The Presence of a Limited Portion of the Pathway *de Novo* of Purine Nucleotide Biosynthesis in the Rabbit, Erythrocyte *in Vitro*. *The Journal of Biological Chemistry*, October 1960.
22. Weinstein, S.: Tactual Sensitivity as a Function of Handedness and Laterality. *Journal of Comparative and Physiological Psychology*, November 1960.
23. Delagi, Edward F.: Rehabilitation of the Homebound in a Semi-Rural Area. *Journal of Chronic Diseases*, 12: 5, November 1960.
24. von Hippel, Peter H., Gallop, Paul M., Seifter, Sam, and Cunningham, Robert S.: An Enzymatic Examination of the Structure of the Collagen Macromolecule. *Journal of the American Chemical Society*, 1960.
25. White, Abraham: Some Biochemical Aspects of Aging, American Association for the Advancement of Science. *Aging*, 1960.
26. Arias, Irwin M.: The Chemical Basis of Kernicterus. *Advances in Clinical Chemistry*, Vol. 3, 1960.
27. Williams, M. H., Jr.: The Effect of Voluntary Increase of the Tidal Volume on the Steady-State Diffusing Capacity of the Lung. *Clinical Research*, 8: 381 (Abstract), 1960.
28. Williams, M. H., Jr.: Book—*Clinical Applications of Cardiopulmonary Physiology*. Paul B. Hoeber, Inc., 1960.
29. Gidez, L. I., Sorensen, D. K. Shreeve, W. W., and Eder, H. A.: Synthesis of Cholesterol (*in vivo*) from 2-C^{14}), Mevalonic Acid in Humans and Swine (Abstr.). *Biochemistry of Lipids*, edited by G. Popjak, Pergamon Press, London, 1960.
30. Gilon, E., Roheim, P. A., and Eder, H. A.: The Effect of Phentolamine on Serum Free Fatty Acids in a Patient with a Pheochromocytoma and in Normal Subjects (Abstr.) *Circulation*, 21: 679, 1960.
31. Roheim, P. A., Haft, D. E., White A., and Eder, H. A.: *In Vitro*, Exchange of Cholesterol in Lipoprotein Fractions (Abstr.). *Circulation*, 21: 652, 1960.
32. Frank, C. W.: Spatial Separation of Sequential Portions of the Inspirate in the Normal Lung. *The Physiologist*, 3: 59, 1960.
33. Frank, C. W., Kiefhaber, F. H., Jordan, A., Akyol, T., Galton, B., and Arora, Y.: Assessment of Mitral Regurgitation by Dye Dilution Technics. *Clinical Research*, 1960.
34. Makover, H. B.: Public Health Problems of Juvenile Delinquency, Editor and participant—Academy of Pediatrics. *Journal of Pediatrics*, Spring 1960.
35. Makover, H. B.: Report of Proceedings of Little White House Conference on Ageing. Monograph, 1960.
36. Laragh, J. H., Ulick, S., Voldzimierz, J., Deming, Q. B., Kelly, W. G., Lieberman, S.: Aldosterone Secretion and Primary and Malignant Hypertension. *Journal of Clinical Investigation*, Vol. 39, No. 7, p. 1091, 1960.

In Press

1. Abramson, A. S., and Delagi, E. F.: The Influence of Weight-bearing and Muscle Contraction on Disuse Osteoporosis. (a) *Proceedings 3d International Congress of Physical Medicine*, (b) *Archives of Physical Medicine*.
2. Abramson, A. S., and Delagi, E. F.: Critical Factors in Electromyographis Instrumentation. *Archives of Physical Medicine and Rehabilitation*.
3. Jaffe, E. R., and Gordon, E. D.: Incorporation of Nicontinic Acid into Pyridine Nucleotides of Erythrocytes and Reticulocytes of Rabbits. *Federation Proceedings*.

4. Makover, H. B.: Communications in Public Health. Delivered at Eastern States Health Conference, May 1960.
5. Makover, H. B.: Statistical Reasoning. *Journal of Indian Medicine Profession*, Bombay, India.

APPENDIX D

Center for Aging Research

Publications and Papers Presented

1. Hunt, G. Halsey, Frame, Elizabeth, and Mohler, Stanley R.: Annual Administrative Review: Chronic Illness. *Journal of American Hospital Association*, April 1960.
2. Mohler, Stanley R.: Problems of Gerontology in the United States. Pan American Medical Association (copies available), May 1960.
3. Mohler, Stanley R.: Aging and Pilot Performance. Current Related Research and Research Needs: Postgraduate Course in Aviation Medicine, Ohio University (copies available), September 1960.
4. Gerber, Joseph H.: Current Gerontological Research. Fourth Annual New England Conference on Aging (no text available), October 1960.
5. Gerber, Joseph H.: Nutritional Aspects of Medical Research for the Aging. American Dietetics Association (no text available), October 1960.
6. Hunt, G. Halsey: Recent Advances in Geriatrics. *Public Health Reports*, December 1960.
7. Mohler, Stanley R.: Aspects of Gerontology in the United States. *Public Health Reports*, December 1960.

For additional information write:

Center for Aging Research
National Institutes of Health
Bethesda 14, Maryland

U. S. GOVERNMENT PRINTING OFFICE: 1961

Public Health Service Publication No. 836